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IP over Ethernet (IPoE) Session Health Checking

draft-patterson-intarea-ipoe-health-04

IPoE (DHCP) vs PPPoE

- Less encapsulation overhead.
- Simpler connection establishment.
- Port-based authentication preferred over CHAP-style user+password.
- PPPoE would require DHCPv6 anyway.

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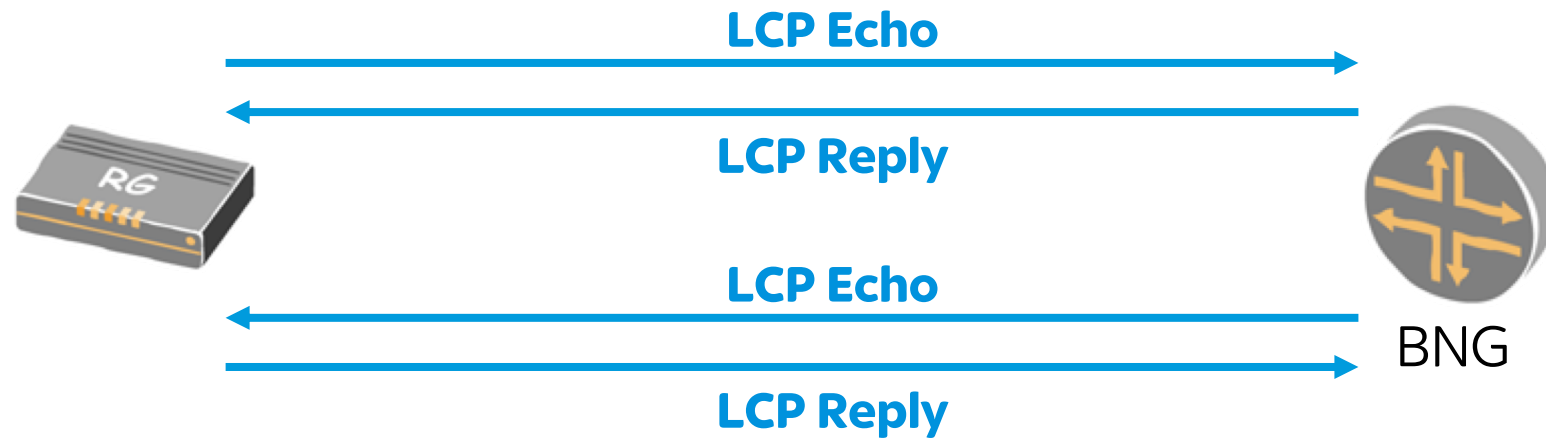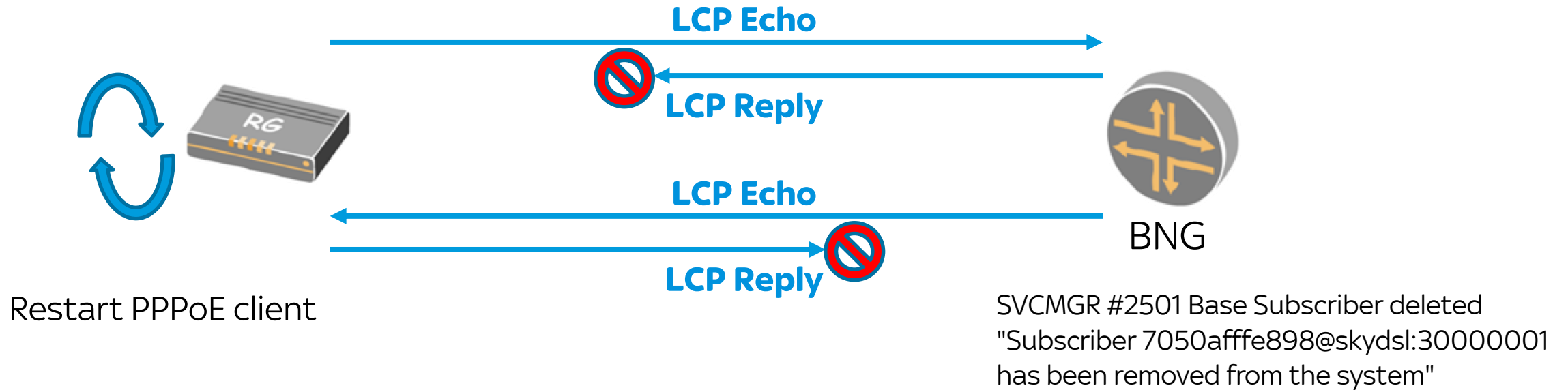- PPPoE would require DHCPv6 anyway.

However:

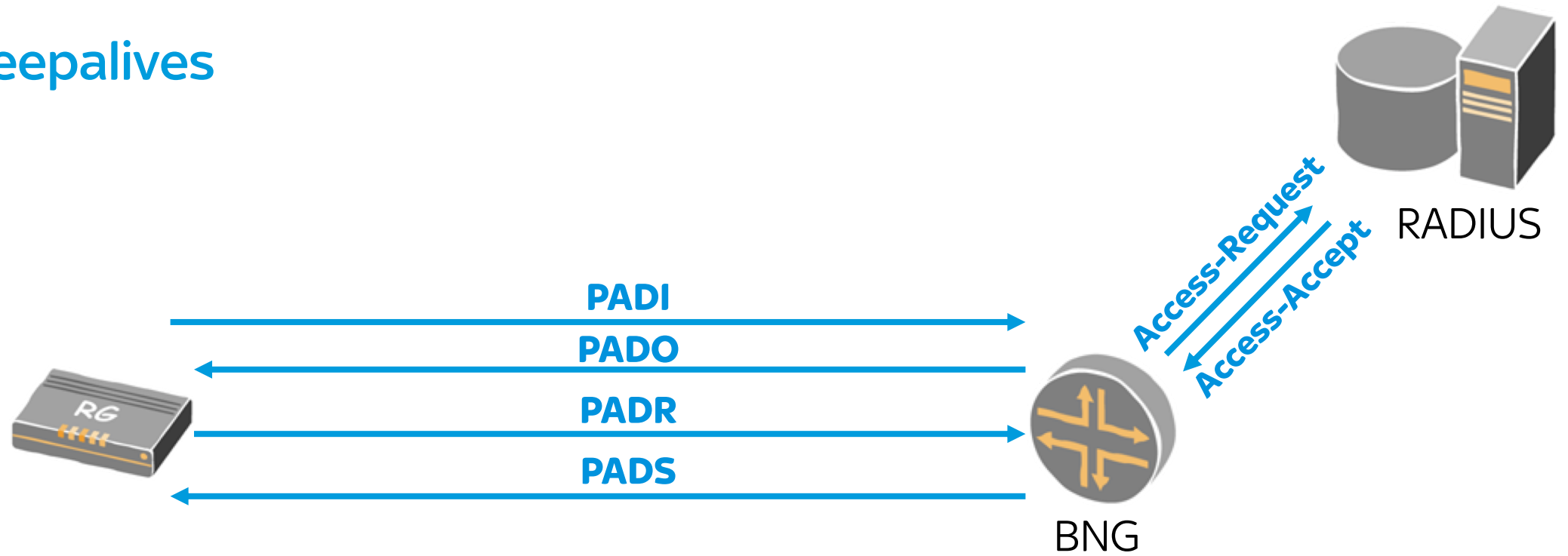- Missing connectivity verification checks, à la PPP Keepalive.

PPP Keepalives

LCP Echo

LCP Reply
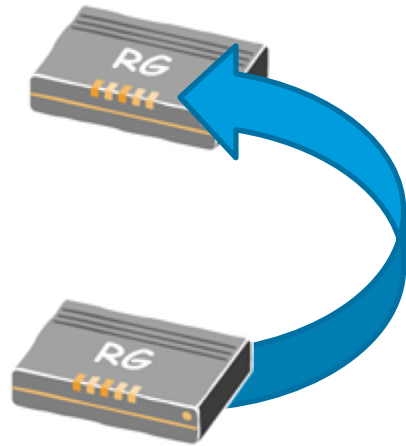
LCP Echo

BNG

LCP Reply

PPP Keepalives

LCP Echo

LCP Reply

LCP Echo

LCP Reply

BNG

Restart PPPoE client

SVCMGR #2501 Base Subscriber deleted
"Subscriber 7050afffe898@skydsl:30000001
has been removed from the system"

PPP Keepalives

PADI

PADO

PADR

PADS

Access-Request

Access-Accept

RADIUS

BNG

IPoE Stale State

Neighbor Solicit / ARP

BNG

"host connectivity lost on 3/1/1:3941.122 in service 400000 for inetAddr = fe80::f00:baa, chAddr=70:50:af:00:05:a9, verify-addr=fe80::f00:baa."
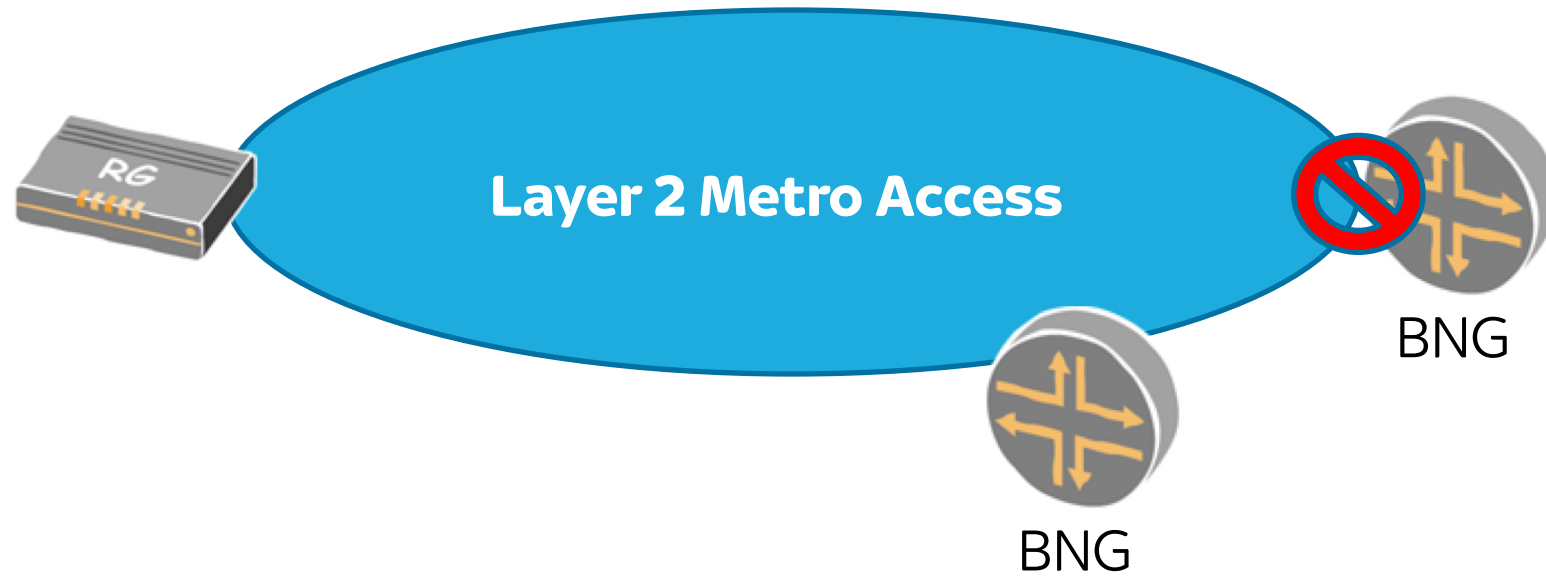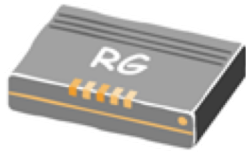
IPoE Stale State

Layer 2 Metro Access

BNG

IPoE Stale State

Layer 2 Metro Access

BNG

IPoE Stale State

Layer 2 Metro Access

BNG

BNG

IPoE Stale State

Layer 2 Metro Access

RG

OLT

BNG

IPoE Stale State

BNG

```
▼ IA Prefix
    Option: IA Prefix (26)
    Length: 25
    Value: 00000e1000000e10382a020c7f082fd70000000000000000...
    Preferred lifetime: 3600
    Valid lifetime: 3600
    Prefix length: 56
    Prefix address: 2a02:c7f:82f:d700::
```
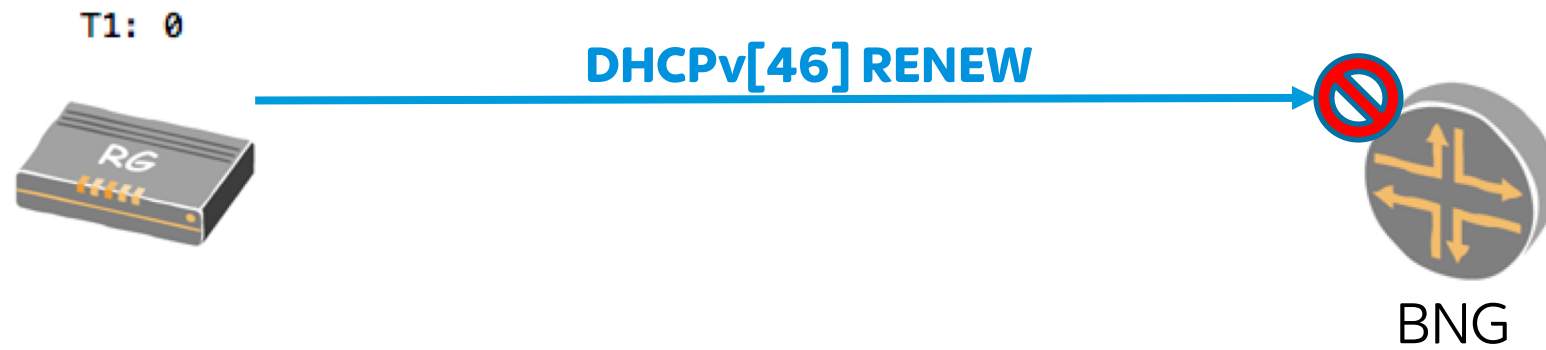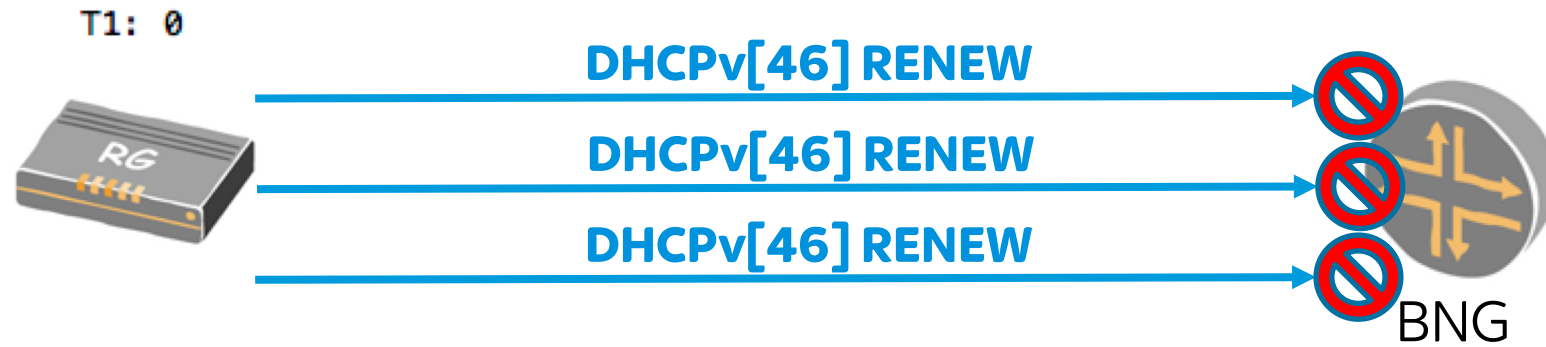
IPoE Stale State

T1: 0

DHCPv[46] RENEW

BNG

IPoE Stale State

IPoE Stale State

```
T1: 0
T2: 0
Valid lifetime: 0
```

DHCPv4 DISCOVER
DHCPv6 SOLICIT

OFFER/ADVERTISE

REQUEST

ACK/CONFIRM

Access-Request

Access-Accept

RADIUS

BNG
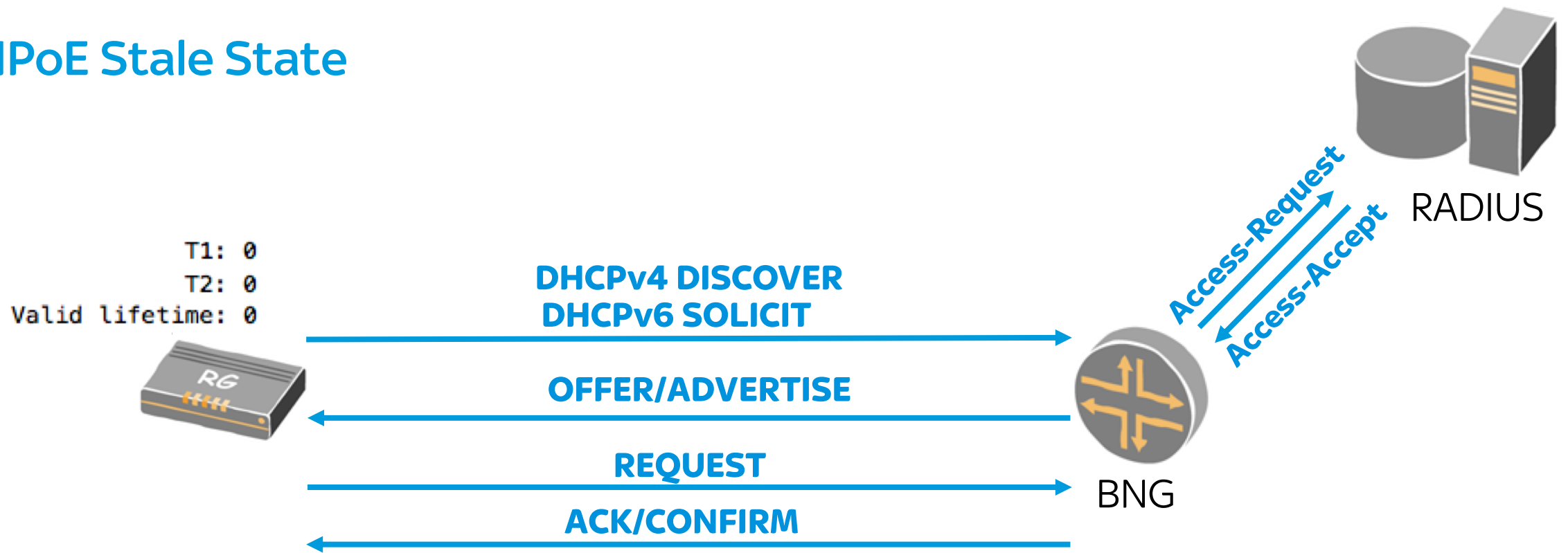
IPoE Session Health Check

- Parameters & Configuration.

- Health Check Mechanisms.

- Actions & Behaviours.

Parameters & Configuration

- **Interval** (Integer): The frequency in seconds, which health checks are sent by the IPoE client.

- **Retry Interval** (Integer): The frequency in seconds, which health checks are sent by the IPoE client, after a failure.

- **Limit** (Integer): The number of failed consecutive checks before an action is taken.

- **Behaviour** (Integer): Specifies what actions are to be taken when triggered.

- **Passive** (Boolean): Forces passive health checks instead of active.

- **Layer2** (Boolean): Forces layer 2 health checks instead of BFD echo.

- **Alternative Target Address** (IP address): Overrides the default target of health checks.

Parameters & Configuration

- Signalled via DHCP.
  - New Option for both DHCPv4 and DHCPv6.
- Local configuration.
  - Default.
  - Manual.
  - NETCONF.
  - TR-069.
  - Etc.

Health Check Mechanisms

- BFD Echo. *(Preferred)*
  - Lightweight.
  - Uses forwarding plane, no impact on control plane.
  - IP-based, validates DHCP lease state as well as layer 2 path.
- ARP & Neighbor Discovery.
  - Default gateway [default].
- Passive.
  - Makes use of the same parameters.
  - Checks the host OS' ARP & Neighbor cache tables.

Actions & Behaviours

- Renew. [default]
  - Softest approach.
  - In-line with existing methods such as those defined in TR-146.
- Rebind.
  - Useful in topologies with multiple DHCP servers.
- Solicit.
  - Quickest recovery option in networks requiring SOLICIT/DISCOVER for authentication.
- Expire & Release.
  - Most aggressive approach.
  - Useful in networks that could retain stale lease information. E.g., Stateful DHCP relays.